June 23, 1988

Docket No. 50-331

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Mr. Lee Liu
Chairman of the Board and
Chief Executive Officer
Iowa Electric Light and Power Company
Post Office Box 351
Cedar Rapids, Iowa 52406

Dear Mr. Liu:

The Commission has issued the enclosed Amendment No. 150 to Facility Operating License No. DPR-49 for the Duane Arnold Energy Center. This amendment consists of changes to the Technical Specifications in response to your application dated December 11, 1987.

The amendment revises requirements for logic system functional testing by extending the interval for performance of those tests from annually to once per operating cycle (typically 18 months), clarifying the definition of "Logic System Functional Test," and revising other sections to reflect new testing practices.

A copy of the Safety Evaluation is also enclosed. An individual notice of issuance will be published in the Federal Register. The Commission has also issued an "Environmental Assessment and Finding of No Significant Impact" associated with this action which will be transmitted under separate cover.

Sincerely,

/S/

James R. Hall, Project Manager
Project Directorate III-3
Division of Reactor Projects - III,
IV, V & Special Projects

Enclosures:
1. Amendment No. 150 to License No. DPR-49
2. Safety Evaluation

cc w/enclosures:
See next page

DFO1
1/1

Office:	LA/PDIII-3	PM/PDIII-3	PD/PDIII-3	OGC-WF1
Surname:	PKreutzer	RHall	KPerkins	SHLewis
Date:	6/10/88	6/10/88	6/10/88	6/9/88

cc:
Jack Newman, Esquire
Kathleen H. Shea, Esquire
Newman and Holtzinger
1615 L Street, N.W.
Washington, D.C. 20036

Office for Planning and Programming
523 East 12th Street
Des Moines, Iowa 50319

Chairman, Linn County
Board of Supervisors
Cedar Rapids, Iowa 52406

Iowa Electric Light and Power Company
ATTN: R. Hannen
Post Office Box 351
Cedar Rapids, Iowa 52406

U.S. Nuclear Regulatory Commission
Resident Inspector's Office
Rural Route #1
Palo, Iowa 52324

Regional Administrator, Region III
U.S. Nuclear Regulatory Commission
799 Roosevelt Road
Glen Ellyn, Illinois 60137

Mr. John A. Eure
Assistant to the Division Director
for Environmental Health
Iowa Department of Public Health
Lucas State Office Building
Des Moines, Iowa 50319

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

IOWA ELECTRIC LIGHT AND POWER COMPANY
CENTRAL IOWA POWER COOPERATIVE
CORN BELT POWER COOPERATIVE

DOCKET NO. 50-331

DUANE ARNOLD ENERGY CENTER

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 150
License No. DPR-49

1. The Nuclear Regulatory Commission (the Commission) has found that:

   A. The application for amendment by Iowa Electric Light and Power Company, et al., dated December 11, 1987 complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations set forth in 10 CFR Chapter I;

   B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;

   C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;

   D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and

   E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment and paragraph 2.C.(2) of Facility Operating License No. DPR-49 is hereby amended to read as follows:

(2) Technical Specifications

The Technical Specifications contained in Appendix A, as revised through Amendment No. 150 , are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

3. The license amendment is effective as of the date of issuance and shall be implemented within 30 days of the date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

for Kenneth E. Perkins, Director
Project Directorate III-3
Division of Reactor Projects - III,
IV, V and Special Projects

Attachment:
Changes to the Technical
Specifications

Date of Issuance: June 23, 1988

ATTACHMENT TO LICENSE AMENDMENT NO. 150

FACILITY OPERATING LICENSE NO. DPR-49

DOCKET NO. 50-331

Replace the following pages of the Appendix A Technical Specifications with the enclosed pages. The revised areas are indicated by marginal lines.

REMOVE	INSERT
1.0-6	1.0-6
3.2-24	3.2-24
3.2-25	3.2-25
3.2-27	3.2-27
3.2-29	3.2-29
3.2-33	3.2-33

22. INSTRUMENTATION

a. Instrument Calibration or Channel Calibration - An Instrument Calibration means the verification or adjustment of an instrument signal output so that it corresponds, within acceptable range and accuracy, to a known value(s) of the parameter which the instrument monitors. The acceptable range and accuracy of an instrument and its setpoint are given in the system design control document and its setpoint is used in the Technical Specifications. Instrument calibration may be performed by any series of sequential, overlapping, or total channel steps such that the entire instrument is calibrated. Instrument calibration includes the Instrument or Channel Functional Test, as appropriate.

b. Channel - A channel is an arrangement of a sensor and associated components used to evaluate plant variables and produce discrete outputs used in logic. A channel terminates and loses its identity where individual channel outputs are combined in logic.

c. Instrument or Channel Functional Test - An Instrument or Channel Functional Test for

(1) Analog channels means the injection of a simulated signal into the channel as close to the sensor as practicable to verify the proper response, alarm, and/or initiating action.

(2) Bistable channels means the injection of a simulated signal into the sensor to verify the proper response, alarm and/or initiating action.

d. Instrument or Channel Check - An instrument or channel check is a qualitative determination of acceptable operability by observation of instrument behavior during operation. This determination shall include, where possible, comparison of the instrument or channel with another independent instrument measuring the same variable.

e. Logic System Functional Test - A Logic System Functional Test shall be a test of all logic components, i.e., relays and contacts, of a logic circuit that perform a safety function, from sensor through and including the actuated device, to verify OPERABILITY. The Logic System Functional Test may be performed by any series of sequential, overlapping or total system steps such that the entire logic system is tested.

f. Trip System - A trip system means an arrangement of instrument channel trip signals and auxiliary equipment required to initiate action to accomplish a protective trip function. A trip system may require one or more instrument channel trip signals related to one or more plant parameters in order to initiate trip system action. Initiation of protective action may require the tripping of a single trip system or the coincident tripping of two trip systems.

g. Protection Action - An action initiated by the protection system when a limit is reached. A protective action can be at a channel or system level.

TABLE 4.2-A

MINIMUM TEST AND CALIBRATION FREQUENCY FOR PCIS

Instrument Channel (5)	Instrument Functional Test (9)	Calibration Frequency (9)	Instrument Check
1) Reactor Low Pressure (Shutdown Cooling Permissive)	(1)	Once/3 months	None
2) Reactor Low-Low Water Level	(1)	Once/3 months	Once/shift
3) Main Steam High Temp.	(1)	Annual	Once/day
4) Reactor Low Water Level	(1)	Annual	Once/shift
5) Main Steam High Flow	(1)	Once/3 months	Once/shift
6) Main Steam Low Pressure	(1)	Once/3 months	None
7) Reactor Water Cleanup High Flow (7)	(1)	Once/3 months	Once/day
8) High Drywell Pressure	(1)	Once/3 months	None
9) Reactor Cleanup Area High Temp. (8)	(1)	Annual	None
10) High Radiation Main Steam Line Tunnel	(1)	Once/operating cycle	Once/shift
11) Loss of Main Condenser Vacuum	(1)	Annual	None

Logic System Functional Test (6)	Logic Test Frequency
1) Main Steam Line Isolation Valves Main Steam Line Drain Valves Reactor Water Sample Valves	Once/operating cycle
2) RHR - Isolation Valve Control Shutdown Cooling Valves	Once/operating cycle
3) Reactor Water Cleanup Isolation	Once/operating cycle

TABLE 4.2-A (Continued)

MINIMUM TEST AND CALIBRATION FREQUENCY FOR PCIS

Logic System Functional Test (6)	Logic Test Frequency
4) Drywell Isolation Valves TIP Withdrawal Atmospheric Control Valves Sump Drain Valves	Once/operating cycle
5) Standby Gas Treatment System Reactor Building Isolation	Once/operating cycle

TABLE 4.2-B (Continued)

MINIMUM TEST AND CALIBRATION FREQUENCY FOR CSCS

Logic System Functional Test (6)		Logic Test Frequency
1)	Core Spray Subsystem	Once/operating cycle
2)	Low Pressure Coolant Injection Subsystem	Once/operating cycle
3)	Containment Spray Subsystem	Once/operating cycle
4)	HPCI Subsystem	Once/operating cycle
5)	HPCI Subsystem Auto Isolation	Once/operating cycle
6)	ADS Subsystem (11)	Once/operating cycle
7)	RCIC Subsystem Auto Isolation	Once/operating cycle
8)	Area Cooling for Safeguard System	Once/operating cycle
9)	Low-Low Set Function	Once/operating cycle

TABLE 4.2-D

MINIMUM TEST AND CALIBRATION FREQUENCY FOR RADIATION MONITORING SYSTEMS

Instrument Channels	Instrument Functional Test (9)	Calibration (9)	Source Check	Instrument Check
1) Refuel Area Exhaust Monitors	Once/3 months	Once/operating cycle	Once/month	Once/day
2) Reactor Building Area Exhaust Monitors	Once/3 months	Once/operating cycle	Once/month	Once/day
3) Offgas Post-treatment Radiation Monitors	Once/3 months (10)	Once/operating cycle	Once/month	Once/day
4) Offgas Pre-treatment Radiation Monitors	Once/3 months (10)	Once/operating cycle	Once/month	Once/day

Logic System Functional Test (6)	Simulated Automatic Isolation and Logic Test Frequency (9)
1) Reactor Building Isolation	Once/operating cycle
2) Standby Gas Treatment System Actuation	Once/operating cycle
3) Steam Jet Air Ejector Offgas Line Isolation	Once/operating cycle
4) Steam Jet Air Ejector Charcoal Bed Bypass	Once/operating cycle

Amendment No. 109,128,143,150

These instrument channels will be calibrated using simulated electrical signals.

4. Deleted

5. Reactor low water level, high drywell pressure and high radiation main steam line tunnel are also included on Table 4.1-2.

6. The logic system functional tests shall include a calibration of time delay relays and timers necessary for proper functioning of the trip systems.

7. These signals are not PCIS trip signals but isolate the Reactor Water Cleanup system only.

8. This instrumentation is excepted from the functional test definition. The functional test will consist of comparing the analog signal of the active thermocouple element feeding the isolation logic to a redundant thermocouple element.

9. Functional tests and calibrations are not required on the part of the system that is not required to be operable or is tripped. Functional tests shall be performed prior to returning the system to an operable status with a frequency not less than once per month. Calibrations shall be performed prior to returning the system to an operable status with a frequency not less than those defined in the applicable table. However, if maintenance has been performed on those components, functional tests and calibration shall be performed prior to returning to service.

10. The Instrument Functional Test shall also demonstrate that control room alarm annunciation occurs if any of the following conditions exist:

    1. Instrument indicates measured levels above the alarm/trip setpoint.

    2. Instrument indicates a downscale failure.

    3. Instrument controls not set in operate mode.

11. A functional test shall be performed for the ADS manual inhibit switches as part of the ADS subsystem tests.

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 150 TO FACILITY OPERATING LICENSE NO. DPR-49

IOWA ELECTRIC LIGHT AND POWER COMPANY
CENTRAL IOWA POWER COOPERATIVE
CORN BELT POWER COOPERATIVE

DUANE ARNOLD ENERGY CENTER

DOCKET NO. 50-331

1.0 INTRODUCTION

The Duane Arnold Energy Center (DAEC) Technical Specification (TS) definition of a Logic System Functional Test (page 1.0-6) states that "a logic system functional test means a test of all relays and contacts of a logic circuit to ensure all components are operable per design intent." The design of the DAEC's Engineered Safety Feature (ESF) logic systems does not allow for testing to the degree necessary to meet the above definition without utilizing a large number of electrical jumpers or lifting a large number of lead wires.

Currently, the DAEC TS require that several ESF logic system functional tests be performed annually. These surveillance requirements are given in Tables 4.2-A, 4.2-B, and 4.2-D of the DAEC TS's. With the recent issuance of License Amendment 143, the DAEC now operates on a nominal 18-month fuel cycle. To avoid plant shutdown solely to perform the annual logic system functional tests, a permanent change to the frequency of these tests is requested by the licensee.

Other requested administrative changes to the DAEC TS are as described below:

1) The requirement to perform a logic system functional test of the logic controlling the Head Spray Mode of the Residual Heat Removal (RHR) system is deleted. During the Cycle 8/9 refueling outage, the equipment associated with the Head Spray Mode of RHR was retired in place under the provisions of 10 CFR 50.59, thereby eliminating the need for this test.

2) Tables 4.2-A and 4.2-B of the TS erroneously list a "Calibration Frequency" associated with each Logic System Functional Test. In fact, any actuating device requiring calibration has an associated calibration frequency specified elsewhere in these tables. This change deletes this tabular entry and thereby corrects an administrative error made by the licensee in Amendment No. 143. Also, an editorial footnote referring to the conversion from an annual to an 18-month operating cycle has been deleted.

3) The definition of a Logic System Functional Test (Definition 1.22e) is revised to more closely conform to BWR Standard Technical Specifications and the revised DAEC testing practices.

4) Note 4 of the "Notes for Tables 4.2-A through 4.2-F" is deleted to ensure consistency with the revised DAEC testing practices. Note 4 describes the use of test jacks, which the NRC has found to be unacceptable for this testing.

The licensee based their proposed change on the following:

The licensee's proposed amendment (Reference 1) of December 11, 1987 revises Technical Specification Tables 4.2-A, 4.2-B, and 4.2-D to extend the surveillance intervals for all ESF Logic System Functional Tests from annually to once per operating cycle. This proposal is based upon engineering judgment with regard to the degree of complexity of the logic system functional testing, i.e., many jumpers and lifted leads must be used to test each logic system to the necessary level to demonstrate that all components are operable per design. The proposed change is in response to the staff's recommendation to Iowa Electric Light and Power Company (IELP) that all Logic System Functional Test intervals be changed to once per operating cycle (Reference 2).

2.0 BACKGROUND

On May 14, 1987, during an inspection related to the IELP program to improve High Pressure Coolant Injection (HPCI) and Reactor Core Isolation Cooling (RCIC) reliability, a Region III inspector determined that a certain surveillance test appeared not to meet the requirements of the DAEC Technical Specifications (TS). These apparent TS discrepancies involved the functional testing of relay contacts in the isolation logics of the HPIC/RCIC systems. Essentially, the initiating isolation relay contacts were jumpered out, not proving them operable per the TS definitions.

A conference was held on June 5, 1987 to discuss this issue, including the basis for the IELP interpretation of TS definition 1.22e. During the June 5, 1987 conference, the NRC stated that, per the staff's interpretation of the DAEC TS, all relay contacts were to be tested and that testing the logic circuits by blocking the master relay isolation contact and jumpering the signal past the initiating contact failed to test initiating logic per definition 1.22e. Following the June 5, 1987 conference, the licensee performed augmented testing of relay contacts per the staff's interpretation transmitted in Reference 3. The results of the augmented testing program were documented in a followup letter (Ref. 4) dated June 26, 1987.

On July 13, 1987, the NRC staff met with the licensee in Bethesda, Maryland. The purpose of that meeting was to discuss the DAEC logic system functional tests as required by the TS and IELP proposals for meeting the staff's interpretation of the DAEC TS.

The licensee presented their basis for concluding that they were in compliance with their TS, but also indicated that improvements could be made to the DAEC surveillance program for logic system functional testing to include testing of certain relay contacts.

Based upon the July 13, 1987 meeting, the NRC staff concluded that the current TS requires that all engineered safety features actuation logic relay contacts be tested. The NRC staff's position is that these tests include all relay contacts and are to be conducted each refueling outage.

In Reference 2, the NRC requested that IELP submit a change to the DAEC TS to comply with the NRC staff's position. The licensee's letter (Reference 1), dated December 11, 1987 is their compliance with this request.

3.0 EVALUATION

The staff has reviewed the DAEC proposed TS change in accordance with Section 7 of the Standard Review Plan and has noted the following:

1) The requested change meets the present TS definition of Logic System Functional Testing in that the enhanced testing to be performed once per operating cycle is a complete test from sensor to actuated device, while the existing annual test is not. The present annual Logic System Functional Test does not verify the operation of the isolation relay contacts. The contacts are bypassed with jumpers, therefore operability is not proven during the test.

2) It has been noted that the licensee's proposed change to the definition of Logic System Functional Test only clarifies the previous definition and in no way changes its existing meaning.

3) In order to meet the TS definition of Logic System Functional Test, as defined in the meeting of July 13, 1987, the licensee is required to perform the Logic System Functional Testing as defined in Reference 3. This testing requires the use of over 200 jumpers, contact blocks and lifting of circuit leads to verify proper operation.

   The augmented Logic System Functional Test will require the particular system/train to be tested to be taken out of service for approximately 4 hours, on average. During this period, the system/train will be unavailable to perform its safety function. A complete test of the Residual Heat Removal (RHR) System would disable or remove different trains or modes of operation for a period of 1 to 2 days to complete testing.

4) The potential for disabling safety equipment or challenging systems and components by lifted leads, installed contact blocks or jumpers and incorrect system lineups as a result of human error will exist as the result of performing the augmented Logic System Functional Testing. Requiring the testing less frequently and conducting the testing while the plant is shutdown will reduce this risk.

5) The DAEC proposed TS change does not change setpoints, plant operations, protective functions, or the design basis of the plant. Therefore, these proposed changes do not create the possibility of a new or different kind of accident from any previously analyzed.

6) During the last outage, the licensee performed a complete (augmented) Logic System Functional Test as documented in Reference 4. The results of the augmented Logic Functional Testing showed no component failures; however, during an earlier special test a single relay (GE HGA series) in the Low Pressure Coolant Injection loop system logic was found to have a failed contact. This single failure would not have disabled the safety function, because the logic is a one-out-of-two taken twice.

7) The staff has reviewed the licensee's administrative changes and notes the following:

   a) The deletion of Logic System Functional testing of the Head Spray Mode of RHR is acceptable, since this mode of operation has been retired.

   b) The staff agrees with the licensee that calibration frequency associated with each Logic System Functional Test can be deleted since system calibration is specified elsewhere in these tables.

   c) The staff concurs with revising the definition of Logic System Functional Test to clarify the requirements of this testing.

   d) The staff agrees with the licensee's intention to delete Note 4 of the "Notes for Tables 4.1.2-A through 4.2-F." This revision will clarify the licensee's method for performing Logic System Functional Testing.

      It should be noted that the NRC does not generally find the use of test jacks to be unacceptable. NRC considers the use of test jacks a more preferable method of testing than the use of jumpers. However, for certain Logic System Functional testing at the DAEC, test jacks were used to bypass relay contacts that should be tested. In this application the staff finds the use of test jacks to be unacceptable.

The staff has reviewed the IELP submittal for DAEC and has concluded that changing the Logic System Functional Test Intervals from annually to once per operating cycle for the Duane Arnold Energy Center is acceptable. The staff bases this conclusion on the following:

1. Requiring the augmented testing to be performed annually with the plant operating creates a situation for potential inadvertent scrams, actuations of equipment, and resultant transients which create unnecessary risks. Once-per-operating cycle testing is performed with the plant shut down. Testing with the plant shut down poses fewer operational challenges to the plant.

2. Existing annual (nonaugmented) testing is incomplete due to isolation logic relay contacts not being properly tested and verified. The once-per-operating cycle test is a complete system test from sensor to actuator.

3. The annual augmented testing requires removing safety-related systems from service while the plant is operating, which is undesirable. The once-per-operating cycle test is performed only with the plant shut down, when the demand for safety systems is considerably reduced.

4. The proposed change does not change setpoints, plant operations, protective functions, or design bases of the plant. The change will not create the possibility of a new or different kind of accident from those previously analyzed.

5. In this case, the once-per-operating cycle test is more desirable since there will be less chance for human error that could inadvertently leave safety-related systems inoperable. The staff defines these human errors as mistakes made by individuals, such as leaving safety systems with improper system line ups, or jumpers left installed or leads lifted which would adversely affect the proper initiation of a safety-related system. Increasing the test interval decreases the chance for human error, thus reducing the chance of unknowingly making safety-related systems inoperable.

6. The staff has reviewed the licensee's proposed administrative changes and concludes that they are acceptable for the reasons listed in Section 3.0, paragraph 7.

In summary the staff finds the once-per-operating cycle Logic System Functional Testing to be a more complete Logic System Functional Test as compared to the existing or augmented annual test. The test and test intervals are consistent with those found in the STS and are sufficient for monitoring the operability of system logic. In addition, since the testing will be performed when the plant is shut down, requiring less system reconfiguration and minimizing human error, the staff believes this test to be a safety improvement.

4.0 ENVIRONMENTAL CONSIDERATION

Pursuant to 10 CFR 51.21, 51.32, and 51.35, an environmental assessment and finding of no significant impact has been prepared and published in the Federal Register on June 16, 1988 (53 FR 22588). Accordingly, based upon the environmental assessment, the Commission has determined that the issuance of this amendment will not have a significant effect on the quality of the human environment.

5.0 CONCLUSION

Based on the above the staff finds the proposed TS changes to be acceptable. The staff concludes, based on the considerations discussed above, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, and (2) such activities will be conducted in compliance with the Commission's regulations, and the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

Principal Contributor: R. Lasky

Dated: June 23, 1988

6.0 REFERENCES

1. Letter, W. Rothert (IELP) to T. Murley (NRC), "Technical Specification Change (RTS-222) Logic System Functional Test Surveillance Interval Extension," dated December 11, 1987.

2. Letter from A. Capucci (NRC) to L. Liu (IELP), "Duane Arnold Energy Center (DAEC)," dated August 13, 1987.

3. Letter, R. McGaughy (IELP) to A. Davis (Region III), "Augmented Logic Circuitry Testing." dated June 11, 1987.

4. Letter, R. McGaughy (IELP) to A. Davis (Region III), "Augmented Logic Circuitry Testing," dated June 26, 1987.

7590.01

U. S. NUCLEAR REGULATORY COMMISSION

IOWA ELECTRIC LIGHT AND POWER COMPANY, ET AL.

DOCKET NO. 50-331

NOTICE OF ISSUANCE OF AMENDMENT TO

FACILITY OPERATING LICENSE

The U.S. Nuclear Regulatory Commission (the Commission) has issued Amendment No. 150 to Facility Operating License No. DPR-49, issued to Iowa Electric Light and Power Company, Central Iowa Power Cooperative, and Corn Belt Power Cooperative (the licensee), which revised the Technical Specifications for operation of the Duane Arnold Energy Center (the facility) located in Linn County, Iowa. The amendment was effective as of the date of its issuance.

The amendment revises requirements for logic system functional testing by extending the interval for performance of those tests from annually to once per operating cycle (typically 18 months), clarifying the definition of "Logic System Functional Test," and revising other sections to reflect new testing practices.

The application for the amendment complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations. The Commission has made appropriate findings as required by the Act and the Commission's rules and regulations in 10 CFR Chapter I, which are set forth in the license amendment.

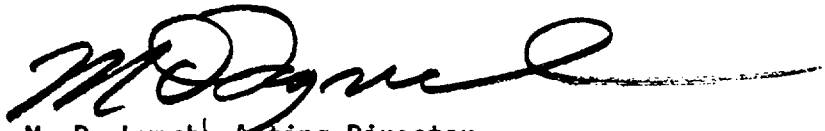
Notice of Consideration of Issuance of Amendment and Opportunity for Hearing in connection with this action was published in the FEDERAL REGISTER on May 4, 1988 (53 FR 15931). No request for a hearing or petition for leave to intervene was filed following this notice.

For further details with respect to this action see (1) the application for amendment dated December 11, 1987, (2) Amendment No. 150 to License No. DPR-49, (3) the Commission's related Safety Evaluation dated June 23, 1988 and (4) the Environmental Assessment dated June 10, 1988 (53 FR 22588). All of these items are available for public inspection at the Commission's Public Document Room, 1717 H Street, N.W., Washington, D.C., and at the Cedar Rapids Public Library, 500 First Street, S.E., Cedar Rapids, Iowa 52401.

A copy of items (2), (3) and (4) may be obtained upon request addressed to the U.S. Nuclear Regulatory Commission, Washington, D.C. 20555, Attention: Director, Division of Reactor Projects - III, IV, V and Special Projects.

Dated at Rockville, Maryland this 23rd day of June 1988.

FOR THE NUCLEAR REGULATORY COMMISSION



M. D. Lynch, Acting Director
Project Directorate III-3
Division of Reactor Projects - III,
IV, V and Special Projects